

## **METALLIC SHINGLE CONSTRUCTION**

### **RELATED U.S. APPLICATIONS**

Not applicable.

### **STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT**

Not applicable.

### **REFERENCE TO MICROFICHE APPENDIX**

Not applicable.

### **FIELD OF THE INVENTION**

[0001] The present invention relates to shingles. More particularly, the present invention relates to shingles that are formed from a sheet of metallic material. Additionally, the present invention relates to shingle assemblies whereby the shingles can be affixed to one another in forming the covering of a roof of a building.

### **BACKGROUND OF THE INVENTION**

[0002] Wood shakes have been highly regarded for roofing that was standing that they are subject to deterioration due to moisture, mildew or other infestation. However, due in part to wood shortage problems, wood shake roofs have been subject to increasing costs and diminishing usage.

[0003] Composite roofing shingles, having alternating layers of asphalt and tar-treated felt topped with crushed rock, lack tensile strengths and can have durability shortcomings. Kiln-fired clay tile, and less

expensive concrete tile versions, provide overall, strength, but are relatively expensive to install and add excessive weight to a structure.

[0004] Roof coverings made from sheet material shingles are well known. The shingles are usually made from sheet metal, notably copper, terne-coated stainless steel or aluminum, and are used to provide a long lasting roof.

[0005] In the past, various U.S. patents have issued relating to metal shingles. For example, U.S. Patent No. 3,381,426, issued on May 7, 1968 to W.J. Heidrichs, describes a metal roofing structure in which a pair of roofing panels are secured together by a slotted covering panel positioned at a juncture of the roofing panels.

[0006] U.S. Patent No. 3,973,369, issued on August 10, 1976 to R.L. Smith, describes roofing shingle having apertures formed therein in upwardly spaced relationship from the lower edges. The apertures are adapted to receive the lower comers of tabs of the shingles in the next higher course of shingles. The apertures are designed so as to permit the passage of rain and other moisture therethrough.

[0007] U.S. Patent No. 4,079,3161, issued on March 21, 1978 to L.L. Vallee, describes a metal roofing shingle having a triangular-shaped gable and cave starting shingles and square or rectangular shaped shingles covering the main body of the roof. The shingles are laid in courses whereby their edges run at an angle from the gable ends and cave edges upwardly toward the ridge of the roof. Each of the shingles is secured to the underlying roof structure by a roofing nail passing through the uppermost comer of the shingle. The lowermost edges of the shingles are interlocked over and under the uppermost edges of adjacent shingles and have their lowermost corners overlapping the uppermost roofing nail secured in a comer of an adjacent shingle.

[0008] U.S. Patent No. 4,185,436, issued on January 29, 1980 to L.L. Vallee, describes a sheet metal

starter shingle and a sheet metal roof covering having these starter shingles. The starter shingle has an upwardly sloping top edge upon which a plurality of rectangular sheet metal roofing shingles can be mounted in a row.

[0009] U.S. Patent No. 4,527,374, issued on July 9, 1985 to R.L.R. Corbin, describes a three-tab shingle with staggered butt edge features. This shingle includes at least one slot dividing the butt edge into two tabs. The lower edge of the tabs corresponds to a portion of the butt edge of the shingle and includes specifically shaped locating edges. These locating edges contribute to the jagged non-uniform appearance of the shingle. These edges are used in conjunction with slot cutouts and notched along the leading and trailing edge of the butt portion to determine proper offset alignment and butt edge exposure.

[0010] U.S. Patent No. 5,349,801, issued on September 27, 1994 to D.W. Verbofski, describes a sheet metal shingle for horizontal application on a roof. The shingle has a male portion along its top edge, a female portion adjacent its lower edge and hook portions along both vertical edges. A bead of resilient compressible material is disposed along the male edge of the shingle and a bead of seal material is disposed in one of the hook portions.

[0011] U.S. Patent No. 5,442,888, issued on August 22, 1995 to P. Ilnycky., describes a roofing shingle that is formed from a square sheet metal blank. One corner of the blank is provided with a pair of open end, back-to-back U-shaped slots transverse to a diagonal passing through the corner. The two sides intersected by the slots are downwardly turned to form a small margin. The other two sides are upwardly turned to form a margin of similar width to the downwardly turned sides. A shingle support is disposed on the under surface of the shingle. The shingles are laid course by course on a pitched roof in a diamond configuration. A shingle of an upper course engages the respective down turned edges of two adjacent shingles of a lower course.

[0012] U.S. Patent No. 5,495,654, issued on March 5, 1996 to Goodhart et al., teaches a method of preparing sheet metal for the fabrication of roofing shingles. The shingles include a finish coating of a coloring and thermosetting polymer which facilitates embossing of exposed portions to simulate the appearance of cedar shakes.

[0013] U.S. Patent No. 5,613,337, issued on March 25, 1997 to Plath et al., teaches a shingle formed with a first side edge folded over toward the top of surface of the shingle to catch moisture and direct it downwardly to the top surface of the next lower shingle. A second side edge of the shingle is not folded. An "S"-shaped fold, spaced apart from the trailing edge fold, receives the unfolded leading edge of an adjacent shingle.

[0014] U.S. Patent No. 5,711,127, issued on January 28, 1998 to B.P. Sabourin, describes a roof shingle having parallel top and bottom marginal edges which are turned inwardly of a central area and are interengagable with similar top and bottom marginal edge portions of the roof shingles.

[0015] U.S. Patent No. 5,946,877, issued on September 7, 1999 to Gallinat et al., describes a composite shingle having target nailing areas. The shingle has a structure having a top surface with an upper headlap portion and a lower butt portion. The headlap portion has one or more targets suitable for indicating a desired fastener location to a shingle installer.

[0016] U.S. Patent No. 6,557,315, issued on May 6, 2000 to P. Tremblay, describes a roofing shingle comprised of a flat rectangular panel made of a metallic sheet material. The top side displays a series of dimples defining corresponding bosses on the underside. A series of connecting elements have one end mounted to a corresponding boss and an opposite end projecting beyond the side edges for connection to the roof surface. The shingle includes a locating means on its top and under surfaces for positioning the shingle with a corresponding shingle so as to define an overlapping region therebetween.

[0017] U.S. Design Patent No. 399,981, issued on October 20, 1998, describes a metal roofing shingle which has a plurality of indentations formed on a top surface thereof.

[0018] It is an object of the present invention to provide a metallic shingle which facilitates the installation on an adjacent shingle.

[0019] It is another object of the present invention to provide a metallic shingle which includes fastener location indications.

[0020] It is another object of the present invention to provide a metallic shingle which is suitably - coated so as to resist deterioration from exposure to the elements.

[0021] It is a further object of the present invention to provide a metallic shingle which is relatively inexpensive, easy to use, and easy to assemble.

[0022] These and other objects and advantages of the present invention will become apparent from a reading of the attached specification and appended claims.

#### BRIEF SUMMARY OF THE INVENTION

[0023] The present invention is a shingle comprising a panel having a first side edge, a second side edge, a front edge and a back edge. The panel is formed of a metallic sheet material. The panel has a first hole formed adjacent the first side edge and a second hole formed adjacent to the second side edge. The panel has a plurality of holes formed adjacent to the back edge.

[0024] In the present invention, a plurality of slots are formed adjacent to the front edge. This plurality of slots extends transversely to the front edge and extends partially toward the back edge.

[0025] The panel has a top surface and a bottom surface. Each of the first and second holes is

surrounded by an indentation in the top surface which extends downwardly as a protrusion on the bottom surface. This protrusion is nestable with the indentation associated with an underlying panel. The plurality of holes are spaced evenly from each other and positioned on the panel between the first side edge and the second side edge. Each of the plurality of holes is also surrounded by another indentation in the top surface which extends outwardly of a protrusion on the bottom surface.

[0026] In the present invention, the panel has an elastomeric epoxy coating affixed to a surface thereof.

The panel also has granules affixed to an opposite surface thereof. The panel has a first primer layer interposed between the granules and this opposite surface of the panel. The granules are adhesively secured to the First primer layer. The panel also has a second primer layer interposed between the elastomeric epoxy coating and the surface of the panel.

#### BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0027] FIGURE 1 is a plain view showing the shingle in accordance with the teachings of the preferred embodiment of the present invention.

[0028] FIGURE 2 shows the assembly of shingles in accordance with the teachings of the present invention.

[0029] FIGURE 3 is a cross-sectional view illustrating the nesting of the protrusion within the indentations associated with the holes of the separate panels.

[0030] FIGURE 4 is a cross-sectional view of the shingle of FIGURE 1.

[0031] FIGURE 5 is a plain view showing the manufacturing of the shingles in accordance with the present invention.

[0032] FIGURE 6 is a plain view showing an alternative embodiment of the shingle of the present invention.

[0033] FIGURE 7 is a plain view showing an alternative embodiment of the shingle of the present invention

#### DETAILED DESCRIPTION OF THE INVENTION

[0034] Referring to FIGURE 1, there is shown the shingle 10 in accordance with the teachings of the present invention. The shingle 10 includes a panel 12 having a first side edge 14, a second side edge 16, a front edge 18, and a back edge 20. The panel 12 is formed from a sheet of metallic material. In general, the shingle 10 has a rectangular configuration.

[0035] As can be seen in FIGURE 1, a plurality of slots 22 are formed adjacent to the front edge 18 and extend transversely to the front edge 18. The slots 22 have a generally narrow configuration and extend partially toward the back edge 20 of the panel 12. A first hole 24 is formed through the panel 12 generally adjacent to the first side edge 14. A second hole 26 is formed through the panel 12 generally adjacent to the second side edge 16. Sets of holes 28 are formed adjacent to the back edge 20. Each of the sets of holes 28 comprises a plurality of separate holes 30, 32 and 34 that are arranged in an aligned configuration and evenly spaced from each other. Each of the sets 28 are positioned between the first side edge 14 and the second side edge 16. Separate holes 36 are formed through the panel 12 in generally axial alignment with the slots 22.

[0036] The unique configuration of the present invention allows the shingle 10 to be properly applied to the underlying surface, namely, the roof of a building. Since the shingle 10 is formed of a metallic material, the shingle 10 of the present invention can be easily formed by mechanical forming operations, such as punching, shearing and forming. The various holes, 24, 26, 28 and 36 are positioned on the surface of the

panel 12 in desired position so as to allow the panel 12 to be joined to an adjacent panel. In the nature of standard roofing shingles, the shingle 10 must be suitable for overlapping relationship with an underlying shingle and for use in conjunction with adjacent shingles.

FIGURE 2 illustrates the manner in which the shingle 10 can be joined with the underlying shingles in a desired manner .

[0037] FIGURE 2 shows the first course of shingles 10 arranged in generally side-by-side relationship. In other words, the second side edge 16 of one shingle 10 will be positioned in side-by-side relationship to the first side edge 14 of an adjacent shingle 10. The course in which shingles 10 appear can continue over the desired dimensions of the underlying surface of the roof. A second course 40 of shingles, 42 have portion overlying the top surface of the underlying shingle 10. Importantly, in the concept of the present invention, the hole 44 will nest into one of the sets of holes 28 on the underlying shingle 10. Similarly, the hole 46 will also nest into another one of the sets of holes 28 on the underlying shingle 10. The hole 24 on underlying shingle 10 can be secured to the roof surface through the use of a fastener, such as a screw. Similarly, another fastener can extend through the hole 44 associated with the overlying shingle 42 and also extend through one of the plurality of holes 30, 32 and 34 so as to engage the roof surface. Another fastener can extend through the other hole 46 of each of the overlying shingles 42 and through another one of the plurality of holes of the set 28 associated with shingle 10. Through the arrangement of holes associated with the present invention, it can be seen that the present invention accommodates different spacings of the shingles 10 and 42. The spacing of shingles will depend upon the desired offset during the



roof construction. The illustration of the arrangement of shingles 10 and 42 in FIGURE 2 is merely illustrative of a single form of the present invention that is suitable for the roofing of a particular building.

[0038] FIGURE 3 shows a unique configuration of the present invention and how the overlying shingle 42 is properly joined to the underlying shingle 10. FIGURE 3 in particular, illustrates the manner in which a fastener 50 will extend through the hole 44 of shingle 42; and also extend through hole 30 of the underlying shingle 10. It can be seen that each of the shingles 10 and 42 includes an indentation 52 formed into the top surface 54 of shingle 42. As a result of the metal forming operation, a protrusion 56 will appear extending outwardly of the bottom surface 58 of shingle 42. The protrusion 56 will be received within the corresponding indentation 60 formed in the top surface 62 of the shingle 10. As a result, the protrusion 56 will "nest" within the indentation 60 so as to achieve a proper alignment of the respective holes 30 and 44. The fastener 50, in the form of a screw, can be easily inserted through the holes 44 and 30 so that the pointed roof-engaging end 62 can be either driven into the roofing surface or screwed into the roofing surface. Head 64 of fastener 50 is illustrated as generally flush with the top surface 54 of shingle 42. The nesting arrangement of shingles 10 and 42 allows a quick and accurate placement of one shingle upon the other. This quick and accurate placement further assures the alignment of the respective holes 30 and 44 during the installation and assembly process. As such, a proper guide way for the fastener 50 is established through the use of the shingles 10 of the present invention.

[0039] FIGURE 4 shows a cross-sectional view of the shingle 10 of the present invention. Importantly, the shingle 10 is particularly configured for use in the outdoor environment. As such, the metal sheet material 70 must be suitably protected against the elements. Initially, a first primer coating 72 is applied to the top

surface 74 of panel 70. Granules 76 are attached by glue 78 onto the primer 72 and onto the top surface 74 of metal panel 70. The granules 76 are in the nature of roofing. These roofing granules are ceramically colored minerals that are used as a surfacing material on asphalt roofing products. These granules 76 are colored with permanent pigments and ceramically bonded and treated with a coating to promote adhesion. These granules 76, along with the use of primer 72, serve to assure that the top surface 74 of metal panel 70 is effectively protected from the elements.

[0040] A coating of a "FLEXGUARD" (TM) layer 80 is applied onto a second primer coating 82 on the bottom surface 84 of metal panel 70. The "FLEXGUARD" (TM) layer 80 is a permanent elastomeric epoxy coating. This single-ply maintenance membrane protects against ultraviolet radiation, prolonged deepwater ponding, animal fats, oils, extreme pHs and temperature extremes. As such, both the bottom surface 84 and the top surface 74 are effectively protected in the unique coating arrangement associated with the present invention.

[0041] FIGURE 5 is an illustration of the manufacturing process 100 associated with the formation of panels 102, 104 and 106 in accordance with the teachings of the present invention. Initially, a large sheet of material 108 is passed through a forming operation. The forming and scoring operation will form the plurality of holes 110 and 112 and slots 114. As can be seen, the holes 110 and 112, along with the slots 114, are formed on each of the panels 102, 104 and 106 as a continuous unit. Within the concept of the present invention, it should be noted that the sheet 108 can extend continuously depending upon the number of separate shingles that are required. Ultimately, a cutting operation will sever shingle 102 from shingle 104 along cut line 120. Another cutting operation will sever shingle 104 from shingle 106 along cut line

122. Once the separate shingles 102, 104 and 106 are separated from each other, they can be suitably stacked for shipment and use.

[0042] FIGURE 2 shows an alternative embodiment of the shingle 200 of the present invention. Shingle 200 is very similar to the previously described shingle except for the fact that the slots 202 have a greater width than the small slots associated with the previous embodiment of the present invention. Each of these wide slots 202 extends inwardly from the front edge 204 of shingle 200. The alternative embodiment of the shingle 200 also includes the hole 206 adjacent to side edge 208 and hole 210 adjacent the side edge 212. Various sets of holes 214, in the form of the previous embodiment, are positioned adjacent to the back edge 216. The shingle 200 in this alternative embodiment of the present invention can be assembled with adjacent shingles in the manner described in association with FIGURE 2 hereinbefore.

[0043] The foregoing disclosure and description of the invention is illustrative and explanatory thereof. Various changes in the details of the illustrated construction can be made within the scope of the appended claims without departing from the true spirit of the invention. The present invention should only be limited by the following claims and their legal equivalents.